HIGH RESOLUTION LASER SPECTROSCOPY OF NICKEL MONOBORIDE, NiB

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Diatomic nickel boride, NiB, has been produced in the UNB laser ablation molecular jet source. Survey spectra, taken at medium resolution with a pulsed dye laser in the 415 – 510 nm region, showed an intense band system which had previously been observed and assigned as a $^2\Pi_{3/2}$ - $^2\Sigma^+$ transition by Zhen et al.[a] Using a single frequency ring dye laser, we have obtained high resolution spectra of the 0-0, 2-0 and 3-0 bands of the most abundant isotopologue, ^{58}Ni^{11}B, and the 2-0 band of ^{60}Ni^{11}B. The rotational analysis showed that the transition was from an $\Omega = 0.5$ upper state to the ground $X^2\Sigma^+$ state. The data were found to fit equally well as $^2\Sigma^+$ - $^2\Sigma^+$ or $^2\Pi_{1/2}$ - $^2\Sigma^+$. The fine structure e/f parity splitting was examined for each of the two options in an attempt to determine the identity of the upper state. Partially resolved hyperfine structure due to the ^{11}B nuclear spin, I = 3/2, was observed and analyzed to try and determine the nature of the boron atom contribution to the ground $^2\Sigma^+$ state configuration. The results of the rotational and hyperfine structure analysis will be discussed.

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[a] J-f. Zhen, L. Wang, C-b. Qin, Q. Zhang, Y. Chen, Chinese J. Chem. Phys. 23, 626 (2010).